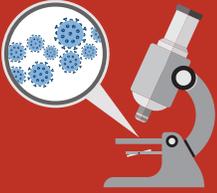


HIV Molecular Cluster Detection and Response



CDC uses cutting-edge technology to detect and respond to clusters of HIV transmission in the United States. This is a critical step that will bring the nation closer to the goal of no new HIV infections.

What is an HIV molecular cluster?

When people receive a diagnosis of HIV, additional tests determine whether they have drug-resistant strains of the virus. Using information from these tests, health departments, together with CDC, can detect **molecular clusters**, or groups of people with closely related strains of HIV. The collection, analysis, and reporting of this genetic data is often referred to as **molecular surveillance**.

HIV constantly evolves and changes. Immediately after one person transmits HIV to another, the genetic sequence of the virus in both people will be almost identical. Thus, finding two similar strains indicates that individuals may have had recent sex or needle-sharing contacts in common. Over time, each person's HIV strain will change (evolve) in different ways, and their viruses will become more and more different.

Identifying similar viral strains indicates that HIV transmission probably happened recently and identifying many similar strains within a short period of time could indicate that transmission is occurring rapidly within a cluster. This information helps health departments and researchers quickly learn important information about how HIV is spreading and where to target their efforts, which in turn prevents more people from getting HIV.

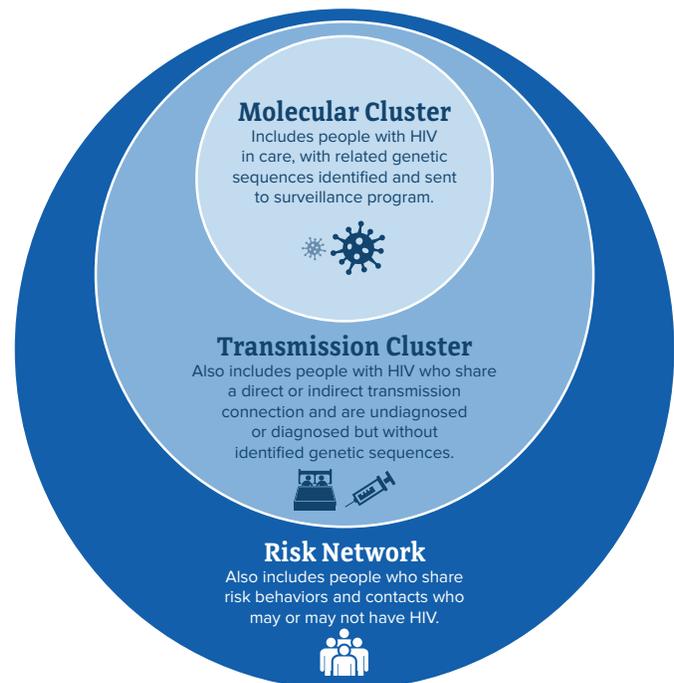
It's important to note that molecular clusters:

- Suggest a link between the cases, but this link may be indirect,
- DO NOT suggest the direction of infection (who transmitted HIV to whom), and
- Only include some (not all) of the cases in the cluster or in the risk network.

What is a transmission cluster?

People in a molecular cluster are part of a larger **transmission cluster**, a group of people living with HIV who have a direct or indirect HIV transmission connection. There are several reasons why a person in a transmission cluster might not be detected in a molecular cluster:

- They have HIV but have not yet had their infection diagnosed.
- They have been diagnosed with HIV but their virus has not yet been genetically sequenced.
- Their virus has been genetically sequenced but that sequence has not yet been reported to the health department.



In addition to being identified through molecular cluster analysis, transmission clusters can be identified in other ways:

- **Health care providers, health department staff or community based organizations (CBOs)** also are often the first to notice increases in HIV diagnoses or patterns in a community.
- Specially trained personnel who conduct **contact tracing** and provide **partner services** are well-positioned to notice unexpected patterns or increases in HIV diagnoses.
- **HIV case surveillance data** can be used to detect unusual increases in HIV diagnosis in a particular geographic area or population. Diagnoses can increase because of increased transmission or increased testing, so additional examination of factors is key to understanding increases.
- **Changes in patterns of other diseases** with similar risk factors, such as sexually transmitted diseases or hepatitis C, may prompt investigation to identify potential HIV transmissions.

Molecular cluster analyses provide data that can uniquely complement more traditional methods of finding hotspots of active transmission. Molecular data can be used to confirm that clusters identified using these more traditional methods represent true transmission clusters. So molecular data can help fill in the missing pieces of the puzzle, or can give us a clue about where we can focus our efforts to make the greatest impact.

What is a risk network?

A **risk network** includes the group of people among which HIV transmission has occurred and could be ongoing. This network includes people who do not have HIV but may be at risk for infection, as well as the people in the transmission cluster who have HIV.

Detecting transmission clusters and risk networks helps us target interventions that we know are effective, preventing future transmission:

- People in a cluster who have HIV and are not receiving medical care can be linked to care where they can begin or re-start treatment, and achieve viral suppression. Care and treatment will help them stay healthy and reduce the chance of transmitting HIV to others.
- People in the risk network who have not recently been tested can be tested for HIV.
 - People in the network who have HIV but don't know it can be diagnosed. Early diagnosis and treatment will keep them healthy and protect their partners.
 - Those who do not have HIV can learn about their risk and be offered interventions such as pre-exposure prophylaxis (PrEP), a daily medicine that can prevent HIV.
- Expanded use of molecular surveillance can advance high-impact prevention by focusing our efforts in areas where multiple recent transmissions have occurred and are most likely ongoing and target prevention resources where they are needed the most.

What can we do when a transmission cluster is detected?

When a growing cluster of HIV transmission and its associated risk network are detected, whether through molecular surveillance or more traditional methods, partners can work together to prevent more transmission.

Local and state health departments can:

- Coordinate with CDC to identify transmission clusters and to characterize risk networks
- Identify communities experiencing rapid HIV transmission and deliver targeted testing and prevention efforts
- Take the lead on rapidly responding to clusters that are in their jurisdiction
- Identify groups of people who are in greatest need of prevention interventions and linkage to care
- Ensure there are rigorous protections in place for personal identifying information

CDC can:

- Watch for early warning signs of increases in HIV transmission and trends in drug-resistant HIV strains
- Coordinate with states to identify transmission clusters and to characterize risk networks
- Take the lead on rapidly responding to clusters that involve multiple states
- Provide guidance to states on rapid response and effective prevention interventions
- Monitor whether HIV prevention efforts are successfully preventing the spread of infection
- Confirm the geographic limits of clusters, allowing jurisdictions to target resources to areas of high need

Providers can:

- Order genotypic HIV drug resistance testing when a patient tests positive for HIV
- Remain alert to increases in HIV transmission and unusual patterns in risk behaviors
- Remain alert for increases in new HIV diagnoses and for unusual patterns in risk behaviors

For More Information:
Call 1-800-CDC-INFO (232-4636)
Visit www.cdc.gov/hiv